

The Creative School



# **Open Educational Resources** *Hungry Algorithms*

Topic:STEAMAge Group:11-14, 14-18 years old





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Imperfect Feed activity based on the Social Media Algorithm learning experience from the Digital Citizenship+ (Plus) Resource Platform. Designed by Youth and Media team at the Berkman Klein Center for Internet & Society at Harvard University in collaboration with the Gobo team (Rahul Bhargava, Anna Chung, and Dennis Jen) at the Center for Civic Media at the MIT Media Lab and is licensed under a Creative Commons AttributionShareAlike 4.0 International license.

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*The Creative School* open educational resources include the following learning modules, here listed according to subject matters and age of the target students:

|    |                                  | 7-11  | <b>Å</b> Å <sub>11-14</sub>                         | 14-18   |
|----|----------------------------------|---|---|---|
|    | Art History                      |   | Let Them<br>Live Again                              | Let Them<br>Live Again                              |
| 9  | Citizenship and<br>Philosophy    | Ethical<br>Dilemmas                                 | Ethical<br>Dilemmas                                 | Ethical<br>Dilemmas                                 |
| S  | Environment,<br>Natural Sciences | Biodiversity<br>and Visual Arts                     | Biodiversity<br>and Visual Arts                     |   |
|    | Facilitation                     | Online learning<br>through object based<br>learning | Online learning<br>through object based<br>learning | Online learning<br>through object based<br>learning |
|    | Geography                        | Urban walks   | Urban walks   |   |
|    | History                          |   |   | How did young people live?                          |
|    |                                  | Photos as memories<br>of the past                   | Photos as memories<br>of the past                   | Photos as memories<br>of the past                   |
| Δ  | STEAM                            |   |   | Critical thinking on climate change                 |
|    |                                  | #Empowering<br>YouthVoices                          | #Empowering<br>YouthVoices                          | #Empowering<br>YouthVoices                          |
|    |                                  |   | Hungry<br>Algorithms                                | Hungry<br>Algorithms                                |
| i, | Teachers Training                | Europeana as a<br>learning tool                     | Europeana as a<br>learning tool                     | Europeana as a<br>learning tool                     |
|    |                                  | Practical approaches<br>to teaching with<br>objects | Practical approaches<br>to teaching with<br>objects | Practical approaches<br>to teaching with<br>objects |

The Creative School project develops learning modules for children and schoolteachers, promoting self-directed learning, critical and visual thinking skills by using cultural heritage content made available by the partner organisations. The present output has developed a set of training materials focusing on the development of thinking skills through engagement with cultural heritage.

More and more children and young people need to develop higher level thinking skills in order to find solutions to social, emotional and economic problems, both personally and in the context of the wider world. They are encouraged to be creative, innovative, enterprising and adaptable, with the motivation, confidence and skills to use creative and critical thinking purposefully.

The main beneficiaries of the project include primary and secondary school teachers, who, through engaging with the project will become equipped with the skills necessary to facilitate pedagogical strategies for creativity and critical thinking. Children and young people involved as participants in the Creative School project will develop the skills required to respond to the challenges offered by the Creative School curriculum.

We hope this material will bring a new dimension to your work and inspire you to use it for fostering creative and critical thinking among young people. The selected topics have been chosen together with teachers and educators coming from Austria, Croatia, Finland, France, Ireland, Italy and the United Kingdom through focus groups and surveys.

Each material is accompanied by key learning points as well as several interesting facts or pieces of information, which are intended to be used to provoke further discussion. The most appropriate age group is also indicated.

Wherever possible we have included a short interactive activity that can be carried out with students or a series of suggested questions to ask, in order to introduce the topics of each learning module. Should you wish to explore certain topics or themes further, each material includes a link to other related ones. When available, a general list of additional educational resources related to the topics is also provided.

The material and accompanying text are designed as standalone educational aids. In this respect, the resource is intended to provide an overall framework from which you can pick and choose the issues most relevant to your activities. The module can be used <image>

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within any country any context as it deals with issues, which are cross-border and universal.

For more information about *The Creative School* project, please visit:

https://www.creative-school.eu/



# **Hungry Algorithms**

Topic:

Age range:



The workshop can be run with different age groups. Examples suitable for each group are proposed, however the teacher can create other exercises, according to the characteristics of the students.

Time:

Materials and tools:

Learning objectives:

Exercises about algorithms.

Encourage children to:

• Critically think about their social media use;

Three sessions lasting 90-120 minutes

- Understand the role of algorithms in social media;
- Understand principles of machine learning;
- Know the importance of personal data and the implications of sharing that data.

## **About the Learning Module**

Hungry Algorithms consists of an introductory learning activity on Artificial Intelligence and three lesson activities that can follow this introduction. The introductory learning activity is targeted towards those who have no basic knowledge on what artificial intelligence is and is therefore targeted towards the younger age bracket of 11-14.

These three activities can be undertaken separately or as a whole. The activities are designed to introduce concepts of Artificial Intelligence, Machine Learning and Natural Language Processing and the social, cultural and ethical implications of these technologies. Each of the lesson activities can be undertaken within 90 minutes although the themes can be explored using additional resources.

# A Recipe for Artificial Intelligence

Students are introduced to the basic concepts of artificial intelligence. To start this activity, review the Introductory Slides and engage the students in discussion using the guide.

# **Materials**

- AI Introductory Slides (Appendix 1)
- AI Bingo Worksheet (Appendix 2)
- Sandwich Algorithm Worksheet (Appendix 3)

#### **Discussion Guide**

Does anyone know what artificial intelligence is? Ask: Does anyone have any examples of artificial intelligence in everyday life? What do these examples have in common? An algorithm is a clear set of step-by-step instructions. It is like a cooking recipe we give to a machine. These instructions can be complicated with multiple variables, for example Say: the recipe could say if there is no linguine at the supermarket, you can use spaghetti instead. Artificial intelligence is when a machine doesn't need the exact step-by-step instructions but can create the recipe itself based on what it has learnt. How would you learn to cook a meal without a recipe? Ask: How would you learn to cook a meal that everyone here would like? You would need to collect information. You would need to know what food people like and what food people don't like. You would need information on how to cook different Say: ingredients, for example what temperature to cook an ingredient before it burns. You would also need information on what ingredients taste good together, and what ingredients don't taste good together. How would you get this information? Ask: How would an AI get this information? You would need to ask. An AI also needs to ask. But an AI can also get information from sensors, such as temperature sensors, and also from large collections of information that Say: already exist. For instance it could get information from every food picture you have liked on Instagram. These large collections of information are called datasets. Do you have any examples of datasets? Have you ever collected a dataset? Now with all this information on how to cook and combine ingredients, and the information on everyone's favourite food, How do we create a recipe everyone likes? AI Say: does this a learning algorithm, which is a way of imitating how we learn. It might take us months of practice, an AI could do this instantly. Let's look at some examples







## **Activity: Al Bingo**

Pass out bingo cards. Students must find a partner who has used an AI system listed on the card and together students must identify the prediction the system is trying to make and the dataset it might use to make that prediction. The first student to get five squares filled out in a row, diagonal, or column wins (or, for longer play, the first student to get two rows/diagonals/columns). After playing, have students discuss which the squares they filled out.

## **Algorithms as Opinions**

Continue reviewing the slides after playing AI bingo. Students will now learn that algorithms, like recipes, are a set of instructions that modify an input to produce an output. Students are then asked to write an algorithm to make the "best" sandwich. Students then explore what it means to be "best" and see how their opinions are reflected in their algorithms. Use the following discussion guide to accompany the slides:

## **Discussion Guide**

| Ask: | Who can remind me what the three parts of an algorithm is?   |
|------|--|
| Say: | An algorithm needs some input data and follows specific steps or instructions to give us<br>a desired output. Computers use algorithms, but so do humans. Algorithms are a lot like<br>a recipe. For example, if I were baking a cake, my algorithm would take in the following<br>ingredients, like flour, sugar, salt, eggs, etc. I would mix together my dry ingredients and<br>then mix in the wet ingredients like eggs or milk. I would pour into a cake pan, set the<br>oven to 200, and put the cake pan in the oven. My output would be a cake! |
| Ask: | Okay, now I want you to write your own algorithms. I want you to take the next 5-10 minutes to write an "algorithm" (or recipe) for the BEST sandwich. Be sure to specify what your inputs are.  |
| Do:  | [Allocate time for students to work using Sandwich Algorithm worksheet]  |
| Ask: | Okay, now I want you to turn to your partner and share your algorithms. I want you to talk about what your algorithms have in common and how they are different.   |
| Do:  | [Give students a few minutes to discuss with their partners.]  |
|      | Who can share with the class what their algorithms had in common?  |
|      | What was different?  |
| Ask: | If you have to give an algorithm a title "How to make the sandwich," what adjective would you use? You can't use "best". (Most students will say yummiest/tastiest)  |
|      | Did any of you include instructions to put away your ingredients after you used them?<br>Or did any of you cut your sandwich into fun shapes? Cut off the crust?   |
| Say: | If you did then you were <u>optimizing</u> for tidiness in your algorithm or <u>optimizing</u> for playfulness or aesthetics!  |



Ask:
 Computer algorithms also optimize for various goals, but sometimes this can be hard to spot. What do you think the goal of Google's search algorithm is?
 [Students might say "best" results. If so, ask them what word they would replace with best like they did earlier. Students might also say "best results for me," so you can prompt students to ask what they mean by that, or how Google might confirm that they've shown "the best results for me." We're looking for answers like: to get us to click on links, to get us to click on advertisers links - things that show students understand the search results *benefit Google first*]
 Do:

pizza place, best movie, news. Ask students why they think the results are different.]



# **AI Driving Lesson**



This lesson activity centres on the ethics of algorithms. Students engage with the platform <u>Moral</u> <u>Machine</u> that was developed by researchers to crowd-source human opinion on how machines should make decisions when faced with moral dilemmas and to provoke discussion of potential scenarios of moral consequence.

In the Moral Machine students are shown moral dilemmas, where a driverless car must choose the lesser of two evils, such as killing two passengers or five pedestrians. Students can act as outside observer to judge what outcome they think is more acceptable and then compare their responses to those of other people.





## **Materials**

- Computer
- Projector
- Internet Browser
- Moral Machine <a href="https://www.moralmachine.net/">https://www.moralmachine.net/</a>



# **Discussion Guide**

| Ask: | Who would be happy to drive around in a car on auto-pilot, with a computer in the drivers seat?   |
|------|---|
| Say: | Self-driving cars use driver assistance systems, it is essential that they recognize what's going on in traffic around them. For this purpose, various systems are combined: cameras, radar systems, and ultrasonic sensors.  |
| Ask: | What do you think an AI autopilot is looking at?  |
|      | What do you think it should look out for?   |
| Say: | Two hackers, known as greentheonly and DamienXVI, managed to get hold of a development version of Tesla's autopilot hardware. Using it, they were able to get a rare look at what the system looks like and how it handles things while under operation. The accompanying video shows a drive through Tokyo and permits the work of the developers to be studied more precisely. Colored lines and surfaces divide up the objects in the environment, as the road has software that identifies what is labeled in green here. [Show the video Looking through the Eyes of a Tesla Driver Assistant] |
| Ask: | What was the artificial intelligence focusing on the road in this video?  |
|      | How do you think the AI could see these things?   |
| Say: | When we perceive the world, we have to rely on our senses. But sometimes they play tricks on us. Sensory misperceptions occur based on erroneous perception, processing, or interpretation of stimuli. Optical illusions stemming from the fact that our perception is based on incomplete information are probably the best known.   |
| Ask: | Can the term "sensory deception" also be applied to computers?  |
| Do:  | [Show the video Experimental Security Research of Tesla Autopilot]  |
|      | Now after watching this video would you still trust an AI driver?   |
| Ask: | Would you trust an AI driver to make the right decisions even if it sensed everything correctly?  |
| Do:  | [Try out the Moral Machine either as a class, or if there are multiple computers break the class into four groups. After students have done some scenarios start a discussion]  |
|      | How did you choose your judgements in each scenario?  |
|      | Did you have a common set of principles?  |
| Ask: | Did you change or update them with each scenario?   |
|      | Who is legally/ethically to blame when the self-driving car makes its 'moral' judgement during a road incident? The programmer? The pedestrian? The driver?   |





# An Imperfect Feed



Participants will be able to understand various ways algorithms help shape the content they see on social media and apply these understandings to their own social media feed(s).

Start this activity by asking if any students use a social media platform. It is more than likely that everyone in the class uses a social media platform. Follow this up with the following questions.



## **Materials**

- Meet Quinn Participant Handouts and Teacher Overview (Appendix 4). Choose one different participant handout to give to each group (you will divide participants into four groups in this learning experience).
- Four envelopes
- Social Media Posts (Appendix 5) to be cut out. Provide each of the four groups of participants with these cut-out 24-32 posts in an envelope
- Projector and projection screen OR, per participant, a handout of the full set of information about Quinn (the Meet Quinn A More Complete Picture: Teacher Overview)
- [For participants] Computers or mobile devices with Internet access
- [One per participant] Paper
- [One per participant] Pens or pencils



# **Discussion Guide**

| Ask: | What social media platform/s do you use most often?  |
|------|--|
|      | Does anyone have multiple accounts on a single platform?   |
|      | What do you usually see on your social media account(s)? If you have multiple accounts on one platform, do you see different content (e.g., photos, videos, text-based posts, ads, etc.) on each account?  |
|      | What do you think determines what you see (in terms of content such as photos, videos, text-based posts, ads, etc.)?   |
| Say: | In this context, let's think about the concept of an algorithm. An algorithm is a clearly given set of step-by-step instructions to solve a problem or accomplish a task.  |
| Ask: | What role do you think algorithms play on social media?  |
| Say: | On social media, algorithms are continually being designed to decide what you see. For instance, algorithms can decide how much content you see from your friends, family, and groups versus public content from businesses, brands, and media.  |
|      | Algorithms can also decide what content format to prioritize, such as video, text-based posts, or images.  |
| Ask: | Who here pays to use the social media platform?  |
|      | Why do you think you don't have to pay?  |
| Say: | Most social media platforms keep track of your engagement with posts by friends, family,<br>and groups, as well as your engagement with public posts from businesses, brands, and<br>media. These platforms' algorithms can predict what you want to see based on these<br>interactions.                       |
|      | The goal is to put content in front of you that you are more likely to engage with by putting posts in your feed from the same, or similar, people and pages you have interacted with before.  |
|      | The ultimate goal is to put advertising in this content that is targeted to you, based on what you have previously engaged with.   |
| Ask: | To what extent do you feel that your social media feed(s) represent your preferences and interests?  |
|      | Have you ever come across a post in your feed(s) that stood out to you as irrelevant /<br>inappropriate / thematically not aligned with your context and background? Would you<br>feel comfortable sharing with the group why you felt this way? Why do you think the<br>algorithms were showing this content? |
|      | Are there any examples of social media posts that stood out to you as positive / timely / thematically very much aligned with your context and background? Would you feel comfortable sharing with the group why you felt this way?  |
|      | Let's suppose an algorithm works so that it only shows you content that you're 100% interested in. What might be the risk or downside to that? Do you think an algorithm should be programmed in such a way that, at times, it shows surprising content (i.e., serendipity)?                                   |



|      | Have you ever seen posts in your feed(s) where the content (e.g., a post addressing politics, or civic engagement issues) seemed suspicious / like it was intended to deceive you? If so, how often? Would anyone feel comfortable sharing an example of this type of post? What was your response when you saw it? [Some participants may have, for instance, dismissed the post, reported it, or talked about it with a friend or family member.]  |
|------|--|
| Say: | To help us think a little more deeply about how algorithms shape social media feeds, let's engage in a group activity!   |
|      | Divide participants into four groups, and provide each group with one of the four Meet Quinn Handouts, and the set of 24-32 social media posts in an envelope. There should be four envelopes — one for each group.]   |
|      | In your groups, first, take a look at the set of posts, and the information about Quinn<br>provided on your handout. Next, select up to 18 posts and arrange them in an order that<br>you think would create a feed relevant to Quinn. Think about what kind of content Quinn<br>would most enjoy engaging with (e.g., time spent looking at, liking, clicking on, sharing, or<br>resharing).  |
|      | [Give participants 15 minutes to engage in this group exercise]  |
|      | [Reconvene all participants, with participants sitting in their group. Ask groups to designate a speaker to present their created feed. Have each group briefly explain 1) what information they received about Quinn, 2) which posts they selected and why, and 3) of the different pieces of information about Quinn provided on their handout, the content they focused on to create the feed.]   |
| Ask: | Was there any information about Quinn that you feel was particularly useful in creating the feed?  |
|      | Was there information about Quinn that you feel was less useful?   |
|      | Which pieces of information about Quinn did you prioritize over others?  |
|      | What information about Quinn would you have wanted to have — to make the algorithm produce a feed that would be even more relevant to Quinn — that you didn't have? Why would you want this information? [For example, Quinn really cares about human rights. However, because participants only had one information point about human rights (i.e., a post about gender equality), it may have been difficult to tailor the feed to specific areas of human rights. It seems that Quinn is interested in gender equality, but is she interested in other human rights issues, and if so, which ones?] |
|      | [For example, Quinn really cares about human rights. However, because participants only had one information point about human rights (i.e., a post about gender equality), it may have been difficult to tailor the feed to specific areas of human rights. It seems that Quinn is interested in gender equality, but is she interested in other human rights issues, and if so, which ones?]  |



## **Activity: A Fuller Picture**

Say: Each group received pieces of information about Quinn. Let's now bring all the information on Quinn together and think about how (if at all) our understanding of what an ideal feed and underlying algorithm for Quinn might be would change.
[Either project the complete set of information about Quinn ("Meet Quinn — A More Complete Picture: Educator Version") on a projection screen or print out and share a copy with each participant.]
Ask: Based on all the information you now know about Quinn, which of the existing feeds and underlying algorithms (created by the four groups) do you think Quinn would find the most engaging? Why?
Knowing the full sum of information, would you keep one of the existing feeds (created by the four groups) and underlying algorithms or create a new feed?

## **Activity Option 1**

Say: Now, let's apply what you learned today about social media and algorithms to your *own* social media feed. Choose an account from a specific social media platform, and select the first 18 posts that appear. Identify ten variables that you think the underlying algorithm is focused on (e.g., your engagement with posts from your friend, a local clothing store, or an athletic team), and write them down on your piece of paper.

[Pass out paper and pens or pencils.]

# **Activity Option 2**

- Say: For those of you interested in the data that informs the algorithm on your *own* social media feed, you can access and download a copy of the information that social media platforms have about you.
  - For those who have a Facebook account, log into Facebook on a desktop computer, and, on the top right of your home page, click the downward-facing blue arrow. From there, click Settings, and then click Your Facebook Information. Then click Download Your Information. Here, you can select which pieces of information you want to download (e.g., ads, location, posts, etc.).
  - For those who have an Instagram account, log into Instagram on a desktop computer and click on the Profile icon in the upper right-hand corner, shaped like a person, and then click on the Settings icon, which looks like a wheel. From there, click on the Privacy and Security button and scroll down to Account Data to click on View Account Data. To look at a specific type of data (e.g., current follow requests, hashtags you follow, accounts you blocked, etc.), click View All.

[Pass out paper and pens or pencils.]





Ask: Based on this information, I'd like you to reflect, in writing, on the following questions:

These files represent some of the data that Facebook and / or Instagram has collected about you. How does Facebook and / or Instagram having all of this information make you feel? Would you rather they did or didn't have this information?

Does this information seem like an accurate representation of you / your preferences? Why or why not?

To what extent do you see your preferences reflected or not reflected in your feed?

Is there any other information about your interests and preferences you would want Facebook and / or Instagram to know about you so that your feed is even more relevant?

What aspects of the information you downloaded do you think shape the algorithm that influences your feed?

What other online platforms or services you engage with might affect your feed? For example, if you buy plane tickets online from a specific travel site, like Expedia, you might then see ads from this site on your social media feed(s).

## **Further Resources**

- <u>Social Media Algorithms: Why You See What You See</u> Article by Sang Ah Kim
- <u>The Social Dilemma</u> Documentary Film (1h 34m)
- The Social Dilemma: A Lesson on Social Media Lesson Plan
- <u>Beware Online "Filter Bubbles"</u> TED Talk (8m 48s)
- <u>Using Google</u> Short Animation (2m 40s)
- Information Literacy in the Age of Algorithms Report by Project Information Literacy
- Bias in Your Search Results Lesson Plan
- The Invisible Machine: Big Data and You Lesson Plan

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# Can AI understand how you feel?

In this learning activity students will explore how to use sentiment analysis in Artificial Intelligence to evaluate and classify emotions or users' online comments. Before booking services or purchasing products online, many people read their reviews online to check the quality and whether others recommend them. Sentiment analysis can classify faces in photographs or text in online reviews as positive, neutral or negative, resulting in the overall classification as positive, neutral or negative.

# **Activity Option 1: Teachable Machine**

Artificial intelligence is the capacity of machines to emulate human abilities in way that we would think of as 'smart'. In machine learning we feed the machine lots of information, showing it what we might want it to do so it can sort out some way to do it all alone. The machine learns and adjusts its method to fulfil its objective.

# **Required Materials**

Computer with webcam

contribution as the correct emotion

- Projector
- Google Chrome
- <u>Teachable machine (https://teachablemachine.withgoogle.com/)</u>
- Paper cards
- Pens



In this activity, we are feeding the machine pictures of emoticons through a camera. The more differed the information we give, the more probable the AI will effectively arrange the









# Discussion

| Ask:        | Why is it important to re   | cognize so   | meone's emotions?   |   |
|-------------|---|--|---|---|
| Do:<br>Ask: | Write or draw some emo<br>Give cards to a student a<br>showing the card.<br>Let the whole class guess<br>[Alternative: Ask student<br>What tells us that a perso<br>expression? | otions on th<br>and ask the<br>s their emo<br>ts to guess<br>on is happy | ne cards, one emotion per<br>m to show the emotion to<br>otions<br>emotions of people in a p<br>y, sad, angry or surprised?                                       | card.<br>the class without<br>icture book]<br>What is neutral |
| Do:         | As a class, create a table  | of informa<br>Emotion<br>Happy<br>Sad<br>Angry                           | tion to look for patterns,<br>Features Smile Wide eyes Teeth visible Dimples Frown Eyes half closed Pinched eyebrows Teeth clenched Nose pinched Eyebrows pointed | for example:  |
|             | Compare your descriptio   | ons of featu   | res to emojis or emoticor   | S.  |
| Ask:        | How do your description<br>What features are used t   | s compare<br>to convey e   | ?<br>each emotion?  |   |

# **Activity Option 2: AI Artwork Review**

14-18

This activity explores a system using NLP, which classifies reviewers' online text as positive, neutral or negative based on words that may appear in the text. This is commonly referred to as "sentiment analysis." Provide a series of online comments for students to view and judge whether they are positive, neutral or negative. Which words give students an overall impression? Provide students with positive, neutral or negative worksheets. Task 1 requires students to classify words as positive, neutral or negative. Task 2 requires students to write and share reviews, and work with their partners to determine whether the overall impression of the review is positive, neutral or negative.

# **Required Materials**

- Computer
- Projector
- Internet Browser
- Online Sentiment Analysis Tool (<u>https://aidemos.microsoft.com/text-analytics</u>)
- Paper cards
- Pens

| Say: | Sentiment analysis is not always reliable. When training AI, through the process of supervised learning, the combination of words and words or images will be classified as positive, neutral or negative. |
|------|--|
|      | Supervised learning is a process in which humans provide many examples for the algorithm, and these examples are what we want the program to identify with a label.  |
| Ask: | What combinations of words could we use that produce an inaccurate sentiment analysis?   |
| Say: | A negative word combined with a positive word, ie no good, don't like, not bad, etc.   |
|      | A paragraph filled with both positive and negative words.  |
| Do:  | Ask students to elect an artwork about Artificial Intelligence from the Ars<br>Electronica Archive and type a brief review into an online sentiment analysis<br>tool                                       |
| Ask: | How well did the sentiment analysis tool work?   |
|      | Was the categorisation accurate?   |



# **Appendix 1: Introduction to AI Slides**

Please, refer to the file: 11-18\_Hungry Algorithms\_EN\_Appendix 1.pdf

| Gotten a weather forecast from a website or used a weather app  | Sent a voice-to-text message   | Used an online search engine like<br>Google or Bing | Seen a Google autofill search<br>result  | Had a writing assignment graded<br>by a computer   |
|---|--|---|--|--|
| Dataset:  | Dataset:   | Dataset:  | Dataset:   | Dataset:   |
| Prediction:   | Prediction:  | Prediction:   | Prediction:  | Prediction:  |
| Used "safe search" on Google  | Seen a suggested response on<br>Gmail to an email  | Used a Snapchat filter (what's<br>your favorite?)   | Played a motion-sensitive video<br>game e.g. Mario Party, Nintendo,<br>Wii U, etc.   | Had an Emoji suggested instead<br>of a word e.g. "lol" is replaced<br>for an Emoji smiley face                             |
| Dataset:  | Dataset:   | Dataset:  | Dataset:   | Dataset:   |
| Prediction:   | Prediction:  | Prediction:   | Prediction:  | Prediction:  |
| Seen a sponsored product on<br>Google or Amazon e.g. "since you<br>bought we thought you<br>might like" | Had an email go to your<br>spam folder (was it actually<br>spam?)  | CDCC  | Clicked on an Instagram ad<br>(what kinds of ads do you<br>normally see on the app<br>compared to your partner?)                 | Seen news articles suggested<br>in a news app (what kinds of<br>articles do you normally<br>see compared to your partner?) |
| Dataset:  | Dataset:   |   | Dataset:   | Dataset:   |
| Prediction:   | Prediction:  |   | Prediction:  | Prediction:  |
| Had an email labeled as "important"   | Seen a suggested ad on Snapchat<br>(if so, what for? How does this<br>compare to what ads your partner<br>sees?) | Had a text auto-completed or used autocorrect       | Listened to a recommended song on<br>Spotify (what kind of music do you<br>usually get recommended compared<br>to your partner?) | Seen a recommended product on<br>Facebook (if so, what for?)   |
| Dataset:  | Dataset:   | Dataset:  | Dataset:   | Dataset:   |
| Prediction:   | Prediction:  | Prediction:   | Prediction:  | Prediction:  |
| Seen a "nudge" reminder on<br>Gmail to respond to an email  | Used a fingerprint to unlock<br>a device or opened a device<br>with your face                                    | Used a map app to find a path to a destination      | Used an app to recognize a song<br>playing   | Communicated with a customer service bot   |
| Dataset:  | Dataset:   | Dataset:  | Dataset:   | Dataset:   |
| Prediction:   | Prediction:  | Prediction:   | Prediction:  | Prediction:  |

# Appendix 2: Al Bingo Worksheet

A.I. BINGO







# **Appendix 3: Sandwich Algorithm Worksheet**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# **Algorithm Sandwich**

Write an "algorithm" to make the **<u>BEST</u>** sandwich:

a. What input data (or ingredients!) do you need?

b. Write out the steps in your algorithm:



# **Appendix 4: Meet Quinn Participant Handouts**

# Meet Quinn #1: Participant Handout

- Is 16 years old
- Best friend's name is Sara
- Already has an iPhone 11

#### Likes:

- Halloween
- Music especially K-Pop; also plays the piano

#### Doesn't like:

• Milk and ice cream — is lactose intolerant



# Meet Quinn #2: Participant Handout

- Preferred pronouns are she / her / hers
- Feels strongly about human rights regularly speaks up for gender equality

#### Likes:

• Healthy food

- Fashion
- TV doesn't own a TV. Sometimes watches Netflix



# Meet Quinn #3: Participant Handout

- Preferred pronouns are she / her / hers
- Best friend's name is Sara
- Cares about friends' opinions
- Cares about school sometimes stresses out about tests

#### Likes:

- Coffee
- Colombia is considering a year abroad
- Halloween
- Cats has one named Max
- Healthy food
- Music especially K-Pop; also plays the piano

- Fashion
- Games





# Meet Quinn #4: Participant Handout

• Is 16 years old

#### Likes:

- Coffee
- Colombia is considering a year abroad Halloween
- Cats has one named Max
- Healthy food
- Music especially K-Pop; also plays the piano

- Fashion
- Games
- Milk and ice cream is lactose intolerant
- TV doesn't own a TV. Sometimes watches Netflix



# Meet Quinn — A More Complete Picture: Teacher Overview

- Preferred pronouns are she / her / hers
- Is 16 years old
- Best friend's name is Sara
- Cares about friends' opinions
- Feels strongly about human rights regularly speaks up for gender equality
- Cares about school sometimes stresses out about tests
- Already has an iPhone 11

#### Likes:

- Coffee
- Colombia is considering a year abroad
- Halloween
- Cats has one named Max
- Healthy food
- Music especially K-Pop; also plays the piano

- Fashion
- Games
- Milk and ice cream is lactose intolerant
- TV doesn't own a TV. Sometimes watches Netflix



**Appendix 5: Social Media Posts**